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ON THE PERIOD VARIATION AND BLAŽKO EFFECT OF XZ CYGNI

Between April 16, 1972 - October 17, 1974, 2870 B.V. photoelectric observations were made on XZ Cygni with the 50 cm reflector at the Astronomical Observatory of the University of Cluj-Napoca (Romania).

Table 1 shows the moments of 38 maxima and the corresponding O-C differences calculated with the elements

$$\text{Max.hel.} = \text{J.D. } 2441453.3856 + 0^{d}.4664731 \cdot E \quad (1)$$

Using the maxima from Table 1, as well as those published by Kunchev (1974), we listed the normal maxima in Table 2 where the O-C differences were calculated with the linear elements from GCVS (1969). Using the normal maxima published by Lange and Gusev (1972) and those from Table 2, we drew up Fig.1 which shows the variation of the O-C values versus the number of main cycle E. It is obvious that, after 1965, a real and very rapid decrease of the fundamental pulsation period of XZ Cygni has occurred. Assuming that the period decrease is proportional to the time, there results a decrease rate of the order of 1.32×10^{-5} days per year. This decrease can be explained on the basis of the star evolution during the instability strip crossing (Kukarkin, 1974), or may be caused by the mass loss which might be significant in the RR Lyrae phase (Laskarides, 1974). Wesselink (1974) shows that theoretical calculations predict the existence of the variables evolving towards the red edge of the instability strip if their period is increasing. This does not necessitate that XZ Cygni, whose period decreases, evolves towards the blue edge of the instability strip.

Figs.1 and 2 show the variation of the O-C differences versus E for the years 1971-1972 and 1973-1974, respectively. The 1971 maxima were visually observed by Bogdanov (1972). The upper part of Fig.3 represents the height variation of the maximum versus E. All the O-C values shown in Figs.2 and 3 where calculated by means of the elements (1).

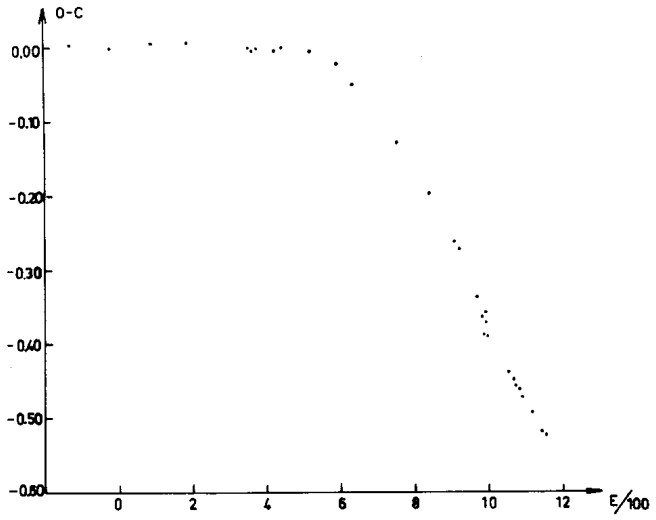
O-C
0.00
-0.10
-0.20
-0.30
-0.40
-0.50
-0.60
0
2
4
6
8
10
12
E/100

Fig. 1

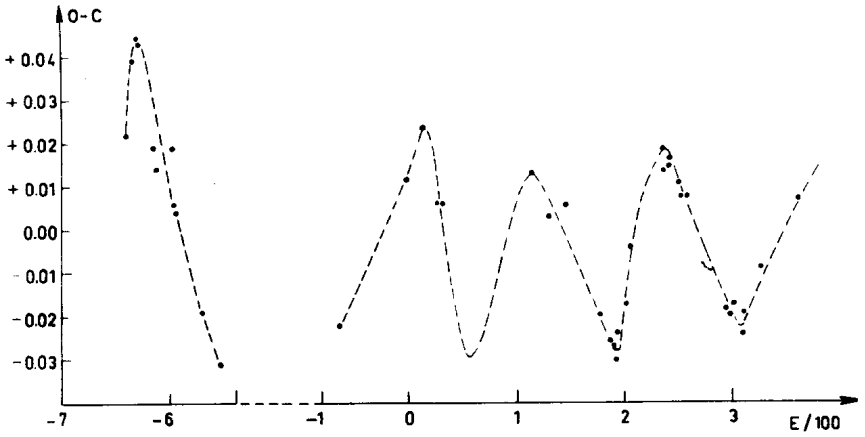
O-C
+ 0.04
+ 0.03
+ 0.02
+ 0.01
0.00
- 0.01
- 0.02
- 0.03
-7
-6
-1
0
1
2
3
E / 100

Fig. 2

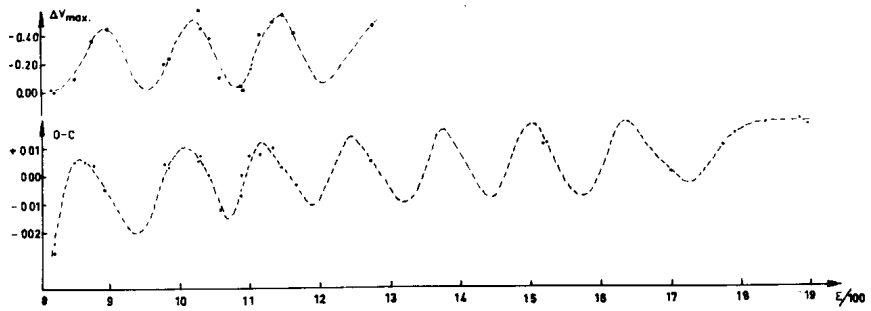

Fig.3

Table 1

Max.hel. JD 2400000+	O-C	Max.hel. JD 2400000+	O-C	Max.hel. JD 2400000+	O-C
41424.4425	-0.0218	41856.4236	+0.0052	41982.3762	+0.0101
453.3970	+0.0114	862.4865	+0.0040	988.4330	+0.0028
461.3390	+0.0234	869.4750	-0.0046	997.2900	-0.0032
467.3858	+0.0060	910.5330	+0.0038	42047.2115	+0.0056
468.3187	+0.0060	913.3310	+0.0029	161.5030	+0.0112
507.5088	+0.0124	932.4585	+0.0050	162.4362	+0.0115
515.4295	+0.0030	933.3933	+0.0069	245.4580	+0.0011
522.4295	+0.0059	939.4507	+0.0001	280.4533	+0.0109
544.3180	-0.0298	947.3688	-0.0118	288.3865	+0.0141
622.2557	+0.0068	960.4355	-0.0064	308.4492	+0.0184
834.4698	-0.0243	962.3077	+0.0000	331.3068	+0.0188
835.3993	-0.0278	967.4460	+0.0070	338.3025	+0.0174
849.4265	+0.0052	974.4430	+0.0070		

Table 2

Max.hel. JD 2400000+	O-C	E	No. max.	Max.hel. JD 2400000+	O-C	E	No. max.
41461.3221	-0.3415	9704	5	41932.4553	-0.4531	10715	6
522.4183	-0.3672	9835	5	962.3088	-0.4607	10778	4
544.3247	-0.3900	9882	5	988.4332	-0.4647	10834	3
565.3515	-0.3592	9927	5	42047.2115	-0.4753	10960	1
573.2650	-0.3776	9944	5	162.4362	-0.4956	11207	2
599.3781	-0.3929	10000	5	280.4531	-0.5232	11460	3
849.4138	-0.4435	10537	6	333.3074	-0.5260	11569	3

The analysis of these diagrams shows that:

(a) There is not an exact reproduction of the secondary cycle. An average period $\Pi = 58^{d}.15$ can be inferred.

(b) An increase of the secondary period Π corresponds to a decrease of the fundamental period P, like in the case of RW Draconis.

(c) The ΔV_{max} curve is shifted by 0.19 of the secondary cycle as compared with the O-C curve.

(d) The amplitude of the O-C diagram decreased from 1971 till 1974. This phenomenon might go on, like in the case of RW Draconis and RR Lyrae, up to the minimum (or "disappearance") of the Blažko effect and, after that, there might occur a new amplitude increase of this effect. The explanation of the "disappearance" in 1963 of the Blažko effect of the RR Lyrae was given by Zaikova et al.(1973).

For the study of the evolution of these effects and more detailed investigations of XZ Cygni pulsations, simultaneous photoelectric and spectrophotometric observations are necessary.

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